CHAPTER 2I
RELIEF WELL CONSTRUCTION

2I-01. GENERAL

This chapter covers exploratory drilling and the construction of relief wells to relieve the subsurface hydrostatic pressure and to control underground seepage created by the presence of a pervious strata that lies close to the ground surface.

a. Location

(1) Check location of wells in field against the contract drawings. Tie—in location to local survey control.

(2) Check number and spacing of wells. Secure permission from design engineers if number and spacing must be changed to meet conditions.

2I-02. EXPLORATORY DRILLING

a. Method of Sampling

(1) Check procedures for dry sampling or undisturbed sampling.

(2) Check depth at which sample is obtained.

(3) Check if required continuous sampling is maintained.

b. Sampling Equipment

(1) Check type and size of sampler against specification.

(2) Check use of core retainer in cohesive soils.

(3) Check use of flap valve in non-cohesive soils.

c. Advancing the Boring

(1) Check use of temporary casing.

(2) Check use of a drilling fluid as specified.

(3) Check use of wash water during boring.

(4) Check that boring is not advanced below planned or sampled depth. Sample should be taken below casing bottom for undisturbed sample.

(5) Check that washing is not done through the sampler.

(6) Check cleaning of bore hole prior to sampling.

d. Samples

(1) Check that all specimens of each type of soil in sampler are retained.

(2) Check packing and labeling of each sample.

e. Records

(1) Check that boring log is kept for each hole.

(2) Check that boring log record and label on sample container agree.

f. Backfilling - Check hole is backfilled and compacted.

2I-03. RELIEF WELL COMPONENTS

a. Material

(1) General

(a) Check length of well screen, length of riser pipe, the well discharge elevation and the gradation of the gravel filters against schedule.

(b) Check varying the depth of the well to permit use of predetermine lengths of screen and riser pipe without field cutting.

(2) Well Screen

(a) PV Well Screen

1. Check type, dimensions and schedule.

2. Check screen for lengths of slotted pipe, dimensions of screen slots, blockage of slots, cracks, and imperfections.

3. Check method of installations.

4. Check joints for:

a. Type and fit.

b. Obstructions.

c. Fastening procedure — screen, poprivets, and/or glue.

d. Fastening with metal screws, spaced evenly.

(b) Metal Screens — Check the Following:

1. Screens constructed of correct metal.

2. Metal of correct gauge.

3. Diameter of screen.

4. Screen openings for size, shape, pattern and spacing.

5. Treatment for corrosion.

(c) Bottom Plug for Well Screens - Check bottom plug of screen for same material as the screen.

1. Check wooden plugs for preservative treatment, diameter, thickness, fastening.

2. Metal Plugs - Check for standard commercial plugs.

(3) Riser Pipe - Check relief well riser pipe for type and size.

(a) Wood Stave Pipe — Check that material and manufacture are same as screen except for openings.

(b) Metal Pipe - Check material, gauge and protective coating.

(4) Gravel Pack

(a) Check Type of material - washed gravel or crushed stone.

(b) Check gradation.

(c) Check hardness.

(d) Check cleanliness.

(5) Outlet for Relief Well - Check material and method of construction.

2I-04. RELIEF WELL CONSTRUCTION

a. Drilling

(1) Check method used for placement of screen, riser pipe and gravel pack.

(2) Check that drilling does not cause excessive displacement or reduce yield.

(3) Check diameter of hole.

(a) Check size of drill unit.

(b) Check for minimum thickness of gravel pack.

(4) Check that ample water supply is available.

(5) Check need for temporary casing.

(a) Use steel casing only.

(b) Prevent cavities outside of casing.

(c) Check diameter - Get minimum thickness of gravel pack.

(d) Check thickness of material.

1. Check distortion.

2. Remove if distorted.

(e) Check that casing extends to minimum depths.

(6) Check type of drilling fluid.

(a) Remove fluid during surging.

(b) Do not permit use of drilling muds with bentonite.

(7) Note obstructions encountered on well log.

(a) Check depth of obstruction.

(b) Check whether partial well will be utilized or abandoned.

(c) Check that abandoned well hole is backfilled.

(d) Check relocating replacement well adjacent to abandoned well.

2I-05. INSTALLATION OF RISER PIPE AND SCREEN

a. Assembly

(1) Check condition and fastening of riser pipe and screen.

(2) Check accurate placement of pipe and screen in pervious strata.

(3) Check number and placing of spiders.

(4) Check that space is available for insertion of tremie to bottom of hole.

b. Joints

(1) Check for approval and shop drawings covering method of making joints.

(2) Check approved method of lowering pipe and screen.

(3) Check that joints do not open when lowering casing.

c. Placement

(1) Check gravel pack material is placed at the bottom of well prior to placement of well screen and riser.

(2) Check that no damage to assembled riser pipe and screen occurs during placing.

(3) Check plug at bottom of the well screen.

(4) Check elevation of top of riser pipe.

(5) Check construction of gravel pack after the screen and riser pipe have been placed.

(6) Check each well for straightness and plumbness.

(7) Check clearance for installation of the pumping equipment for testing the wells.

2I-06. GRAVEL PACKING

a. Gradation - Check prior to placement.

(1) Check for segregation in stockpiles.

(2) Check gradation of filter material used in conjunction with gravel pack material.

b. Placement

(1) Check bottom and top depth of the gravel pack.

(2) Check use of tremie.

(3) Check minimum segregation.

(4) Check elevation.

(5) Check elevation of tremie is above water surface.

2I-07. SURGING AND PUMPING OPERATION

Check that prior to surging and pumping the well screen is cleaned. Check on proper care and disposal of drilling fluids during drilling and well development.

a. Alternate Surging and Pumping Method

(1) Check that fines and drilling mud are removed.

(2) Check draw down.

(3) Check flow.

b. Simultaneous Surging and Pumping Method

(1) Check equipment.

(2) Check procedures.

(3) Check damage to screen and/or plug.

(4) Check addition of gravel pack material due to settlement.

(5) Monitor for continuing excessive amount of fines. Consider recommending possible abandonment because of excessive fines.

2I-08. BACKFILLING OPERATIONS

a. Material Placement

(1) Check placing of sand layer on gravel pack.

(2) Check backfilling from sand layer to finished grade.

(3) Check concrete backfill.

(a) Do not resurge after concrete is placed.

(b) Use tremie for concrete placement under water.

(4) Check removal of temporary casing.

(5) Check filling of all pits.

(6) Check disposal of surplus material.

2I-09. PUMPING TESTS

a. Equipment - Check that all necessary equipment is on hand.

b. Records — Maintain prescribed records of test results.

c. Operation

(1) Check continuous pumping is maintained.

(2) Check that sand or other material collected in well is removed.

(3) Check that no other pumping is done in vicinity until full recovery in original well.

(4) Check final cleanup and backfill of excavated areas.

2I-10. PIEZOMETERS/WELLPOINTS

a. Material

(1) Check pipe for grade of material, nominal diameter, type of coupling and preservative treatment.

(2) Check well point for grade, length and mesh screen size.

(3) Check guard posts for size, length and type of cap.

b. Installation

(1) Check locations and elevations.

(2) Check method of drilling.

(3) Check need for guard posts.

(4) Check filling with water after installation.

(a) Check rate at which the water falls in the tube.

(b) Check that piezometer is in a pervious stratum in hydraulic contact with the pumping zone.

(c) Check for clogged tubes - Remove and reinstall.

2I-11. PROTECTION OF EXPOSED METAL SURFACES

Check that exposed surfaces are galvanized or painted.